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THE DISTRIBUTION OF THREE NATURALIZED CRUCIFERS

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Late in the autumn of 1906 I noticed a strange cruciferous plant in a vacant lot near my home on the south side of the city of Chicago. It was growing by the sidewalk and had been subject to such severe treatment by children who use such spaces for playgrounds that I was not certain as to its specific identity, except that it was a *Diplotaxis*. It was not observed the next season, but it had survived and good specimens were obtained the past summer which showed it was *D. muralis* (L.) DC. I have not seen it elsewhere nor heard of its presence hereabouts from others. The range accorded it in Britton and Brown's Illustrated Flora (1897) is: "Waste places and ballast, Nova Scotia to New Jersey and Pennsylvania, chiefly about cities." This is substantially repeated in Britton's Manual (1901). The Gray's New Manual (1908) says: "About Atlantic ports and rarely inland," but without specifying how far from the coast. In Beal's Michigan Flora (1904) a single station is given, Grand Rapids, about the same distance from the coast as Chicago. Not having been mentioned in previous editions of Gray's Manual, it may be regarded as a comparatively recent introduction. As the migration of adventive plants is a matter of interest it seems well to record its appearance here.

In 1890 I recorded the finding of another cruciferous plant, *Nasturtium sylvestre* R. B., since called *Roripa sylvestris* (L.) Bess, and which now has another name, *Radicula sylvestris* (L.) Druce, the common yellow cress. It was growing in the low ground adjacent to Salt Creek, a tributary of the Desplaines [No. 3, Vol. 9, of TORREYA, comprising pages 45-64, was issued March 26, 1909.]

River, and along the highway that crosses the creek not far from Western Springs, a few miles west of Chicago. Since then it has spread throughout the region, being abundant by water courses, and especially so by the low margins of the Desplaines to Joliet and below. It should now be looked for southwest of here along the Illinois and perhaps the Mississippi, to which rivers the Desplaines is tributary. As it does not require wet grounds exclusively for prosperity, but may do well by moist roadsides or even on drier railway embankments, creeping up probably from near by ditches, it has still another means of distribution.

This plant seems to have received its first notice in American botany in 1818, both by Nuttall in his *Genera* (2: 68), and by Barton in his *Compendium Florae Philadelphicae* (2: 55), both published that year. It was not mentioned by Barton in his earlier work, *Prodromus of the Flora Philadelphica* (1815), nor in Muhlenberg's *Catalogue* (1813), nor in Pursh's *Flora* (1814). Taking these dates as a starting point, it may be concluded that it was introduced into this country not far from that time, since otherwise it could hardly have escaped the eyes of those who then represented the most active botanical center in the land. Under the name of *Sisymbrium vulgare* Persoon (*sylvestre* L.), or the creeping water rocket, Nuttall states of it: "On the gravelly banks of the Delaware, near Kensington, Philadelphia. Introduced? Agrees exactly with Sir J. E. Smith's very accurate description, *Flor. Brit.*, 2, p. 701. I have never before seen it in America." Barton, under *Sisymbrium sylvestre* L., says: "This plant covers large patches of ground on the low wet margins of the Delaware, just above Kensington; and it has every appearance of being a native there. It is not improbable, however, that it has been accidentally introduced in that neighborhood, where at least it is unequivocally naturalized. I have this summer found young leafing specimens four miles higher up the Delaware." From the tenor of this and from the question mark used by Nuttall it would seem that there was some doubt about its foreign origin. In Torrey and Gray's *Flora of North America* (1838-40), under *Nasturtium sylvestre* R. Br., Philadelphia is the only station mentioned, Nuttall being cited

as authority. So also in Eaton and Wright's Botany (1840), and Wood's Class-Book (1854). In Gray's Manual (1856) it appears with an additional station, the entry being: "Wet meadows near Philadelphia and Newton, Mass., *C. J. Sprague*." In the fifth edition (1868) the range had been extended, as we read: "Massachusetts to Virginia, rare." This is repeated in the sixth edition (1889). In the Illustrated Flora (1897) the range is still further extended. "Occasional from Massachusetts and Virginia to Ohio." In Britton's Manual (1901) the range is "Newf. to Mass., Va. and Mich." It had found a place in Beal's Michigan Flora (1904) but was not in the preceding catalogue of Beal and Wheeler (1892), the single station being Detroit. In Kellerman and Werner's Catalogue of Ohio Plants (1893) a single station is also mentioned, Painesville, near Lake Erie, or just east of Cleveland.

One cannot from these data make out more than a general movement of the plant north and south, near the Atlantic coast, or westward toward the interior, either from the original station at Philadelphia or from other points of introduction along the seaboard. I find it mentioned for New York in a report of the State Cabinet of Natural History for 1865. The regent reporting on the topic refers to a previous list of Torrey, made in 1853, in which it does not appear, and says, that to his knowledge it had been reported from no other place than the one mentioned, Flushing, Long Island. The authority for the station was Mr. W. H. Leggett, who subsequently, as well as others, gave additional localities for New York and vicinity, as I find recorded in the Bulletin of the Torrey Botanical Club from time to time, up to 1889. One of these by Addison Brown mentions it in 1879, among ballast plants, as if a new introduction by such means in that special case.

Taking the rest of the state of New York, the plants of the central and western parts are quite well represented in four catalogues or floras issued between 1865 and 1896. The first of these is Paine's "Plants of Oneida County and Vicinity" (1865). That of David F. Day, "The Native and Naturalized Plants of the City of Buffalo and Vicinity" (1882), took in most of the territory west

of the Genesee River, as well as a portion west of the Niagara, as its radius was one of fifty miles about Buffalo. The Cayuga Flora of Professor Dudley (1886) was for the basin of Cayuga Lake and some adjoining ground, though covered in part already by Paine's Oneida list. The three lists mentioned do not record the plant. In the "Plants of Monroe County and Adjacent Territory," published in 1886 by the Rochester Academy of Sciences, it is listed for places near the Genesee River, being abundant in some of them. Macoun does not give it in any list of Canadian plants up to 1890, that being the date of some entries as "additions and corrections to parts I-IV" of his Canadian catalogue. I can add as a matter of personal observation, that in the summers of 1882 and 1884 I spent some weeks examining streams, lakes, and ponds in western New York for the study of Najadaceae, but collected other plants as well. The localities were principally south of the area recorded in the Rochester list and east of that of the Buffalo list, being in the counties of Wyoming, Genesee, Livingston, and some adjoining parts of Monroe and Ontario counties. I did not meet with the plant. Judging by the rate at which it has spread since it was first observed in the Desplaines valley, it is not likely to be present in a locality for any length of time without becoming abundant enough to attract attention, since it soon forms extensive mats or beds in favorable localities.

Though the year of discovery is not generally given in the publications cited, the time of publication is covered by ten years for places as widely separated as Rochester, Painesville, Detroit, and Chicago. This is about seventy years after the first notice by Barton and Nuttall by the Delaware. The distribution between these places and the seaboard and between one another, if in any way connected, must be ascribed to other causes than that of steady accretion of area along lines of natural or unaided seed distribution, however this may act in localities where a plant is once established. Nor are the places mentioned so connected by water communication that plants of this character would be likely to traverse the spaces in the reverse direction to the course of drainage, however this may aid when the direction of flow is in their favor. Yet they are on main lines of railway

traffic, and to some extent of lake navigation, if these may have any connection with such seemingly sporadic dispersal of plants. That lines of railway are important factors in plant migration, especially for those of a weedy nature, is readily seen by one passing along their roadbeds. But there are evidently other means by which plants, whose seeds cannot be borne by currents of air, are able to cross widely intervening spaces. For those that grow in water or in the feeding places of migratory birds, seeds lodged in their feathers or in the mud that may cling to their feet is a plausible conjecture for dispersion. The transmission of undigested seed in the alimentary canal of birds is also the source of wide dispersion of plants. But when once established, as in the case of this plant in the Desplaines valley, which has now been under observation nearly twenty years, the natural flow of the water bearing plants or seeds that may be taken up by it becomes a means of the more effectual dissemination in a given area. A specimen collected in 1892 by Dr. W. S. Moffatt on the banks of Salt Creek at Elmhurst has upon the label the statement: "abundant locally, covering several acres of creek-bottom." This being higher up the stream than where I found it in 1890, from its abundance may have been an earlier station and the source of those at Western Springs. Dr. Moffatt in the same connection mentions its presence at Riverside where Salt Creek enters the Desplaines River.

The case with the third crucifer, *Sisymbrium altissimum* L., is somewhat different, as it doubtless came into this region from the northwest; it is given as *S. Sinapistrum* Crantz in Macoun's Catalogue among the additions and corrections to parts I-IV, published in connection with part IV. It had then (1890) been "introduced in a number of places along the Canadian Pacific Railway." The earliest date recorded is 1883, at Castle Mountain, Rocky Mountains. In 1886 it is mentioned as by Lake Superior; in 1889 at a station forty-five miles east of Toronto. The first authentic record I have for Chicago is an unnamed specimen received from Dr. Moffatt, collected at Forest Glen, 1893; it was soon after seen by him in the western part of the city. The first place mentioned is on the Chicago, Milwaukee, and St.

Paul railroad and can well account for the line of introduction. It soon spread to various localities in and around Chicago, though I did not see it in the locality where I reside till 1900. In 1903 I found it common by the side of the Lake Shore and Michigan Southern railroad at Dune Park, Ind., thirty-five miles east of here. It is a quite common weed in the waste grounds of Chicago now. In Beal's Michigan Flora the first date given for a locality is Benton Harbor, 1896. This is on the east side of Lake Michigan, nearly opposite Chicago. The entry is also made, "later in many localities." As the Gray's New Manual states that it is "locally abundant as a pernicious weed" it may be considered as quite generally spread throughout the northern parts of the United States and the southern part of Canada. Since Britton and Brown give it a place as a ballast plant at New York, there may also be other centers of migration from eastern harbors, but the main line has evidently been from the northwest.

The spreading of this weed has been quite rapid, gaining a large area in about twenty years. It produces seeds in great abundance. As I have observed it the height does not generally exceed 5 to 8 dm., that is, not very tall as one might infer from its specific name, though the stature is more or less influenced by the character of the soil. When crowded by its own kind or by other growths it may be very slender and but little branched, but with ample room it is bushy-branched, the diameter equaling or exceeding the height, or of a somewhat globular form, like a tumble-weed. Whether it actually functions as such I have seen no case, but the shape is one that suggests that it could be easily rolled by the wind if loosened from the ground by any means. These are the possibilities of a tumble-weed.

CHICAGO, ILLINOIS